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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,303	10/14/2003	Eko N. Onggosanusi	TI-35477	7910
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TEXAS INSTRUMENTS INCORPORATED				
P O BOX 655474, M/S 3999				
DALLAS, TX 75265				
EXAMINER				
PUENTE, EVA YI ZHENG				
ART UNIT		PAPER NUMBER		
2611				
NOTIFICATION DATE		DELIVERY MODE		
05/17/2010		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com

# Office Action Summary

**Application No.**

10/687,303

**Applicant(s)**

ONGGOSANUSI ET AL.

**Examiner**

EVA Y. PUENTE

**Art Unit**

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 January 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 3, 6, 9-11, 14, 19-23, 30, 33, 34, 36-40, 42, 45, 46 and 53 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 30, 33, 34, 36 and 37 is/are allowed.
- 6) ☒ Claim(s) 19-23 and 45 is/are rejected.
- 7) ☒ Claim(s) 1, 3, 6, 9-11, 14, 38, 39, 42, 46, 53 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-646)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments, see Amendment, filed 1/15/10, with respect to the rejection(s) of claim(s) 1, 3, 6, 9-11, 14, 19-23, 30, 33-34, 36-40, 42, 45-46, and 53 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made.

### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities: on line 8, please delete "estimates for" after "wherein", and add -- the estimate of --.
3. Claim 3 is objected to because of the following informalities: on line 3, please delete "a" after "calculating", and add -- the --.
4. Claim 6 is objected to because of the following informalities: on line 1, please delete "computation of the estimates for", and add -- estimate of --.
5. Claim 9 is objected to because of the following informalities: on line 10, please delete "estimates for the signal" after "wherein", and add -- equalizing the receiver signal --.
6. Claim 14 is objected to because of the following informalities: on line 2, please change "equalization" before "is" to -- equalizing --.
7. Claim 23 is objected to because of the following informalities: on line 2, please change "equalization" before "is" to -- equalizing --.

8. Claim 38 is objected to because of the following informalities: on line 1, please delete "the" before "transmitter", and add -- a --. Please delete "the" before "encoded", and add -- an --.
  9. Claims 39, 42, and 46 are objected to because of the following informalities: they are dependent upon canceled claims 50-52.
  10. Claim 40 is objected to because of the following informalities: on line 1, please change "computation" to -- estimate --. On line 2, please delete "estimates for the" before "second".
  11. Claim 45 is objected to because of the following informalities: on line 11, please delete "estimates for the signal" after "wherein", and add -- equalizing the receiver signal --.
  12. Claim 53 is objected to because of the following informalities: on line 1, please delete "estimates for the signal" after "wherein", and add -- the estimate of the communication channel --.
- Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 45 and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onggosanusi et al (US 7,181,167) in view of Becker (US 2004/0139140).

a) Regarding claim 45, Onggosanusi et al disclose a method for interference-resistance for multiple users using closed-loop transmit diversity (CLTD) at a receiver comprising:

receiving a signal (signals are received at antennas 1-Q shown in Fig. 3a);  
computing a CLTD weighting vector from the received signal ("compute weights for transmitter antennas" block);  
providing the CLTD weighting vector to a transmitter ("to feedback channel"); and  
using the CLTD weighting vector ("compute weights for transmitter antennas" block), a channel estimate ("physical channel estimates" block), and spreading codes ("despread" block) for each user to suppress interference ("detection with interference cancellation" block) by  
equalizing the received signal (Col 11, L9-11);  
despreading the equalized received signal (Col 11, L9-11); and  
coherently combining the despread equalized received signal ("parallel-to-serial" block).

Onggosanusi et al disclose a closed loop MIMO transceiver system to minimize interference. Onggosanusi et al did not explicitly disclose an expression as

$$z_{ZF} = (H^H H)^{-1} H^H r, \quad Q \geq P.$$
 However, Becker discloses a zero forcing solution expressed as (equation 15; [0045]). Zero forcing is a well known equalization technique in a communication system. Therefore, it is obvious to one of ordinary skill in the art at

the time of invention was made to combine the zero forcing of Becker with equalization of Onggosanusi et al. One of ordinary skill in the art would be motivated to do so to effectively remove interference in a wireless communication system.

b) Regarding claim 19, Onggosanusi et al disclose wherein the despreading applies the spreading codes from each user to the equalized received signal (Col 11, L9-11).

c) Regarding claim 20, Onggosanusi et al disclose wherein the despreading produces a symbol stream for each user (inherent from despreading; Col 11, L9-11).

d) Regarding claim 21, Onggosanusi et al disclose wherein the coherent combining applies the CLTD weighting vector to despread symbol intervals (Fig. 3a).

e) Regarding claim 22, Onggosanusi et al disclose wherein the coherent combining further applies the channel estimate and spreading codes from each user (Fig. 3a).

f) Regarding claim 23, Onggosanusi et al and Becker disclose a MIMO communication system comprising equalization, but did not explicitly disclose the performance of equalizing is implemented as a bank of filters. However, it is well known in the art that the equalization is applied to the number of communication channels, which is based on transmit and receive antennas. For example, when the transmitter has two antennas and the receiver has three antennas, the equalization is applied to six communication channels. Thus indicates a bank of six filters for equalization.

Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to implement a bank of equalization filters based on the number of transmit and receive antennas. One of ordinary skill in the art would be motivated to do so to facilitate optimum channel estimation in a wireless communication system.

***Allowable Subject Matter***

6. Claims 30, 33, 34, and 36-37 are allowed.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eva Y Puente whose telephone number is 571-272-3049. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/EVA Y PUENTE/

Examiner, Art Unit 2611

May 12, 2010